

Innovations in Automobile Engineering

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Abstract – The Automobile Industry Is rapidly evolving with time. New technologies have been successfully implemented, however growing consumer demands have posed new challenges in front of the automobile industry. In this paper, we have come up with some ideas that can be used for the benefit of the customers

I. INTRODUCTION

First of all, let us start with what an automobile is. An automobile is a wheeled motor vehicle used for transporting passengers and goods and also carries its own engine. It has been estimated that the number of automobiles has crossed one billion with figures still rising rapidly across the globe. Designing an automobile is a very complex procedure which includes overall design, security systems, car safety, engine design, engine efficiency and with the growing volume and demand, the job of an automobile engineer has become more and more complex. In this paper we have a detailed look at three aspects of automobile designing :-

Security in steering lock

An analysis about the existing technology and suggested measures

Use of Oxygen sensors

Proposed modifications to the existing systems.

Weight Reduction techniques

Comparative study between the existing materials and the proposed innovation

II. SECURITY IN STEERING LOCKS

Steering is the term applied to the collection of components, linkages, etc. which will allow a vessel or vehicle to follow the desired course. The basic aim of steering is to ensure that the wheels are pointing in the desired directions. This is typically achieved by a series

of linkages, rods, pivots and gears. A steering column connects the steering wheel to the steering mechanism or transfers the driver's input torque from the steering wheel.

Modern vehicles are fitted with a steering lock which is an anti-theft device. It is fitted to the steering column usually below the steering wheel. The lock is combined with the ignition switch and engaged and disengaged either by a mechanical ignition key or electronically from the vehicle's electronic control unit. These locks were introduced on many General Motor products in 1969

However it has been observed that despite the security systems being in place, instances of hot wiring of cars, car thefts have been observed. To combat this problem we have proposed an advanced security lock in steering systems of automobiles. It is basically a lock system which will deactivate the motion of the steering column. The key features of the system are given below:

- It will be a normal locking system which uses some mechanism which will provide mechanical strength as well as security of the vehicle.
- At the time of full braking the break lever will be locked so that the car cannot move due to full break action.
- The accelerator will be locked at the no acceleration position so that the car cannot get sufficient fuel to run.
- Total security system will be controlled by a single locking system .
- This invention will provide better kind of security system to stationary vehicles
- This security system will be available at a very low cost.

- This system is applicable for any kind of vehicle, it may be commercial vehicle or personal use vehicles.

III. OXYGEN SENSORS

Every new car and most cars produced after 1980, have an *oxygen sensor*. The sensor is part of the emissions control system and feeds data to the engine management computer. The goal of the sensor is to help the engine run as efficiently as possible and also to produce as few emissions as possible. The oxygen sensor is positioned in the exhaust pipe and can detect rich and lean mixtures. The mechanism in most sensors involves a chemical reaction that generates a voltage. The engine's computer looks at the voltage to determine if the mixture is rich or lean, and adjusts the amount of fuel entering the engine accordingly. The reason why the engine needs the oxygen sensor is because the amount of oxygen that the engine can pull in depends on all sorts of things, such as the altitude, the temperature of the air, the temperature of the engine, the barometric pressure, the load on the engine, etc.

Suggested modifications:-

- Modern oxygen sensors usually work when the temperature range is in between 392 to 1442 F. This part can be modified by increasing range .if it starts working at lower temperature range then it's efficiency will increase
- Oxygen sensor is installed in exhaust pipe which controls the emission. But at the same time it generates some amount of voltage which is very small in amount. if we increase the dimension of the sensor then it will generate more amount of voltage & this voltage can be used for different purposes.
- At the same time exhaust emission will decrease which will be good for the environment.

IV. WEIGHT REDUCTION TECHNIQUES

Traditionally car bodies have been made from a variety of materials. Family cars are made of materials like steel whereas super cars like F1 cars are made up of materials which are lighter like carbon fiber. The high cost of carbon fiber is mitigated by the material's unsurpassed strength-to-weight ratio, and low weight is essential for high-performance automobile racing. Racecar manufacturers have also developed methods to give carbon fiber pieces strength in a certain direction, making it strong in a load-bearing direction, but weak in directions where little or no load would be placed on the member. Conversely, manufacturers developed omni

directional carbon fiber weaves that apply strength in all directions. This type of carbon fiber assembly is most widely used in the safety cell monocoque chassis assembly of high-performance racecars. In this paper we have suggested some materials which can be used for the construction of super cars and make them even more lighter and efficient. The materials and some of their properties are listed below which can be used for a comparative study between them:-

S-Glass Epoxy composite fiberglass Tensile strength MPa (ksi) : 2,358 (342) lighter than carbon fiber. working temp b/w 150 and 300 centigrade susceptible to damage Fibers made primarily from silica-based glass containing several metal oxides offer excellent thermal and impact resistance, high tensile strength, good chemical resistance and outstanding insulating properties insulating properties, also keep the car's interior cool in summers, and warm in winters, for longer amount of time, unlike metal's conducting properties. S-2 glass is approximately 40-70% stronger than E-glass

V. CORROSION-RESISTANT GLASS FIBER

When glass fibers are exposed to water, they become eroded due to leaching. To protect against water erosion, a moisture-resistant coating such as a silane compound is coated onto the fibers during manufacturing. Adding resin during composite formation provides additional protection. The result is corrosion-resistant glass (called C-glass). Some types of glasses perform better than others when exposed to acids or bases. Both C-glass and S-2 glass offer good corrosion resistance when exposed to hydrochloric or sulfuric acid. E-glass and S-2 glass resist sodium carbonate solution (a base) better than C-glass.

Fiber Cost

Cost often is the deciding factor in choosing an appropriate glass type. It is priced based on quantity, filament diameter and other factors, bulk E-glass roving typically less expensive per pound, than C-glass. S-2 glass roving is typically more expensive. Product designers must weigh the benefits of advanced glass fibers against their higher cost in order to make the best selection for their application.

Thermal Properties

As temperatures increase, glass fibers lose tensile strength. C-glass performs poorly in high-temperature applications and should not be used for them. While E-glass and S-type glass lose about 50% of their tensile strength at 1000° F, their strength at high temperatures is

still considered good. mild steel tensile strength is kind of lower. fiberglass is less brittle, more flexible.

VI. UNITS USED

TEMPERATURE-CELSIUS AND FAHRENHEIT

TENSILE STRENGTH-MEGAPASCAL(Mpa) AND
KIP PER SQUARE INCH(ksi)

VII. REFERENCES

- [1] en.wikipedia.org/wiki/Steering_wheel
- [2] a textbook of automobile engineering by rk rajput
- [3] basics of automotive engineering by cp nakra

